PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 2996103	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. SE99/00310	International filing date *(day/month/year)* 02.03.1999	Priority date *(day/month/year)* 02.03.1998
International Patent Classification (IPC) or national classification and IPC7 G03F 7/20, G03F 7/207, G02B 26/06 // G03F 1/00, H01L 21/027		
Applicant MICRONIC LASER SYSTEMS AB et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
02.09.1999	06.03.2000
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Telex 17978 PATOREG-S Facsimile No. 08-667 72 88	Authorized officer Bengt Christensson/MP Telephone No. 08-782 25 00

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/SE99/00310

I. Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

☒ the international application as originally filed.

☐ the description, pages _____ , as originally filed,
pages _____ , filed with the demand,
pages _____ , filed with the letter of _____ ,
pages _____ , filed with the letter of _____ .

☐ the claims, Nos. _____ , as originally filed,
Nos. _____ , as amended under Article 19,
Nos. _____ , filed with the demand,
Nos. _____ , filed with the letter of _____ ,
Nos. _____ , filed with the letter of _____ .

☐ the drawings, ~~sheets~~/fig _____ , as originally filed,
~~sheets~~/fig _____ , filed with the demand
~~sheets~~/fig _____ , filed with the letter of _____ ,
~~sheets~~/fig _____ , filed with the letter of _____ .

2. The amendments have resulted in the cancellation of:

☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, ~~sheets~~/fig _____

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

V. Resoned statement under Article 35(2) with regard to novelty, inventive step r industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-37	YES
	Claims		NO
Inventive step (IS)	Claims	1-37	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-37	YES
	Claims		NO

2. Citations and explanations

The claimed invention relates to an apparatus for creating a pattern on a workpiece. Radiation illuminates a spatial light modulator (SLM). A projection system creates an image of the modulator on the workpiece and a data delivery system receives a digital description. Patterns are converted to modulator signals.

It is an object of the present invention to provide an improved pattern generator for printing precision patterns.

This is achieved in that a mechanical system positions the workpiece and/or projection system relative to each other. An electronic control system controls the position of the workpiece, the feeding of signals to the modulator and the intensity of the radiation. Drive signals and modulating elements create modulation states larger than two.

A method of exposing a light sensitive material is known from US-A-5 539 568 (fig. 7). A light source (704) is used to provide a beam of light for input into a homogeniser (708).The light passes through an aperture (710) and enters a polarised beam splitter (712).The beam passes through a 1/4 wave plate (714) and is reflected by a phase modulator (716). Once the beam has passed through the 1/4 wave plate (714) twice, its polarisation is reversed and it passes through the beam splitter (712). The light passes through an aperture (718) before leaving the phase shift illuminator (700) and enters the remainder of the lithography system (702). The light beam (720) is transversely phase modulated and may be considered to be comprised of multiple contiguous parallel portions or beams, each having a different phase (column 7, lines 3-49). One type of micromirror device that is a particularly suitable phase modulator is a spatial light modulator (SLM) (column 6, lines 23-29).

.../...

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V.

The essential features in claim 1 differ from the cited document in that modulation states larger than two are created.

The modulation states according to claim 1 are considered to give rise to surprising technical effects i.e. uniformity of the image from pixel to pixel and independence of exact placement of a feature relative to the pixels of the SLM. Thus, this claim is not considered obvious for a person skilled in the art.

In accordance with the arguments stated above, the invention in claims 1-37 is novel, is considered to involve an inventive step and has industrial applicability.

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Claims shall contain: a characterising portion—preceded by the words "characterised in that," "characterised by," or any other words to the same effect (Rule 6.3 (b)).

The technical features mentioned in the claims shall preferably be followed by the reference signs relating to such features (Rule 6.2 (b)).

It is recommended that fig. 1 be provided with reference signs and that the description be provided with the same signs (Rule 5.1 (a)(v)).

The reference signs on p. 7-8 of the description (S1,S2,S3,etc) do not correspond to those of fig. 5 (51,52,53 etc.).

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
Box PCT
Washington, D.C.20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 26 October 1999 (26.10.99)	
International application No. PCT/SE99/00310	**Applicant's or agent's file reference** 2996103
International filing date (day/month/year) 02 March 1999 (02.03.99)	**Priority date** (day/month/year) 02 March 1998 (02.03.98)
Applicant SANDSTRÖM, Torbjörn	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

02 September 1999 (02.09.99)

[] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

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